



BUILDING COMMON GROUND: EXPERIMENTAL APPROACHES

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- but without the midwives....

Building common ground

- A defining feature of human activity is the widespread use of objects, material as well as virtual (**interobjectivity...**).
- Sharing of outer worlds - in a physical, mental, and semantic sense - supports coordinating actions and establishing joint understanding, also outside an immediate here-and-now.
- Language may be conceived of as a tool for human interaction and both words and objects, as material symbols, may be proxies for communication.
- Situations of misunderstanding may both be caused by and indexed by 'living in different worlds' in a material and a semantic sense.
- We will explore when people in interaction build common ground.

Research questions:



- How does the material world as context and as enabling medium influence communication and understanding?
 - ▣ How do we establish socially significant objects and symbolic patterns through a history of interactions?

- How does “culture” as context affect communicational strategies?
 - ▣ Which are the effects of different trajectories, e.g. produced individually, by a pair, or in a larger community?

- Can we measure effects of building common ground by:
 - ▣ Quantifying effects on perception, cognition and/or action?
 - ▣ Quantifying effects on intersubjective coordination?
 - ▣ Tracing physiological and neurocognitive processes involved in, and/or emerging from patterns of interaction?

KEY PEOPLE



Riccardo
Fusaroli,
semiotics:
building
shared
context



Lars Bach:
biology:
simulations of
interactions



Karsten Olsen,
linguistics and
cognitive
science:
sharing
confidence



Kristian Tylen:
semiotics:
building shared
context

Two Projects

- Experiment I:
The Lego project



- Experiment II
Sharing confidence in
a joint perceptual
decision task



Experiment I: The LEGO project

- Cooperation with LEGO Learning Institute + LSP facilitators
- Lego Serious Play:
 - ▣ A procedure to negotiate and build together abstract notions



Structure of the investigation



- 32 participants in groups of 5/6 people
- LSP-inspired LEGO construction sessions: build your understanding of the concepts: “trust”, “diversity”, “teamwork”, “leadership”, etc.
- Individual vs. Collective
- Photographic documentation and heart rate monitoring sensors
- fMRI session using photographic images of the LEGO models as stimuli

Examples of models ...

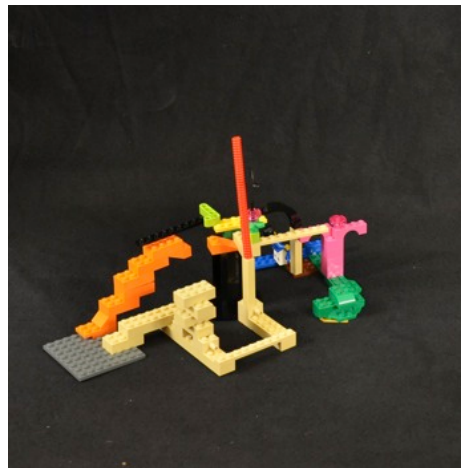
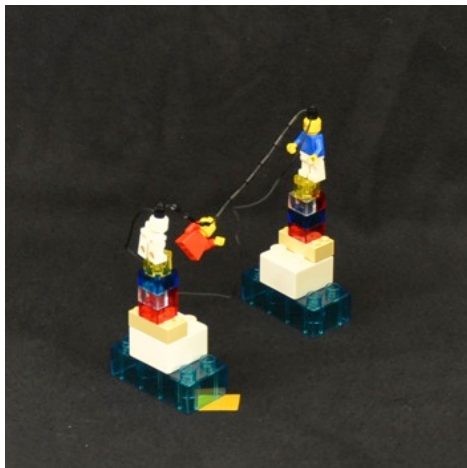
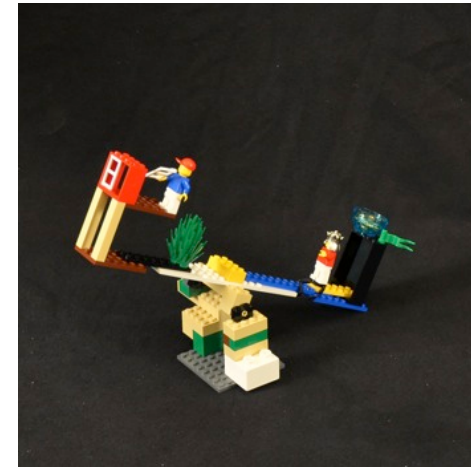
Trust



Diversity



Team Work



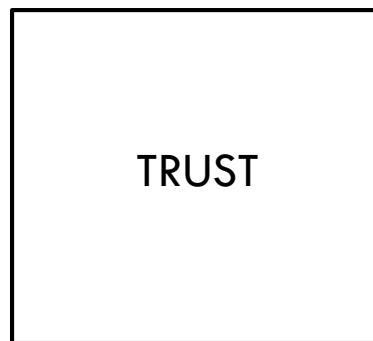
The contrasts

	Individual construction	Collective construction
Participation	Models, that I built myself	Models, that I built collectively with my group
Non-participation	Models, that someone else built individually	Models, that someone else built collectively

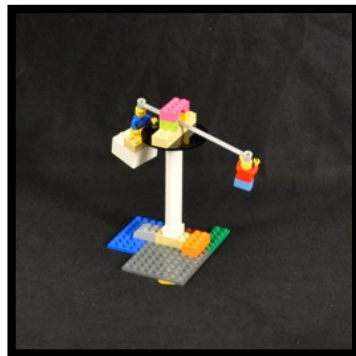
Structure of the fMRI experiment

Two Tasks:

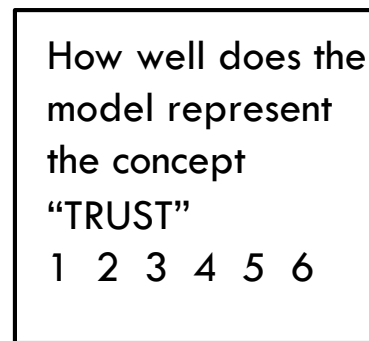
- An intelligibility task: relate to the LEGO models as a source of meaning
- A mental rotation task: relate to the LEGO model as a physical object



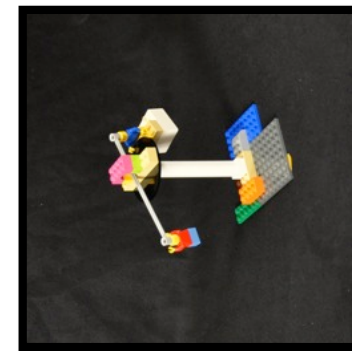
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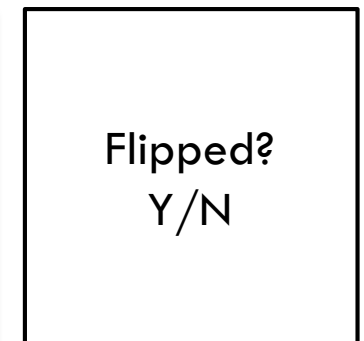
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Hypotheses

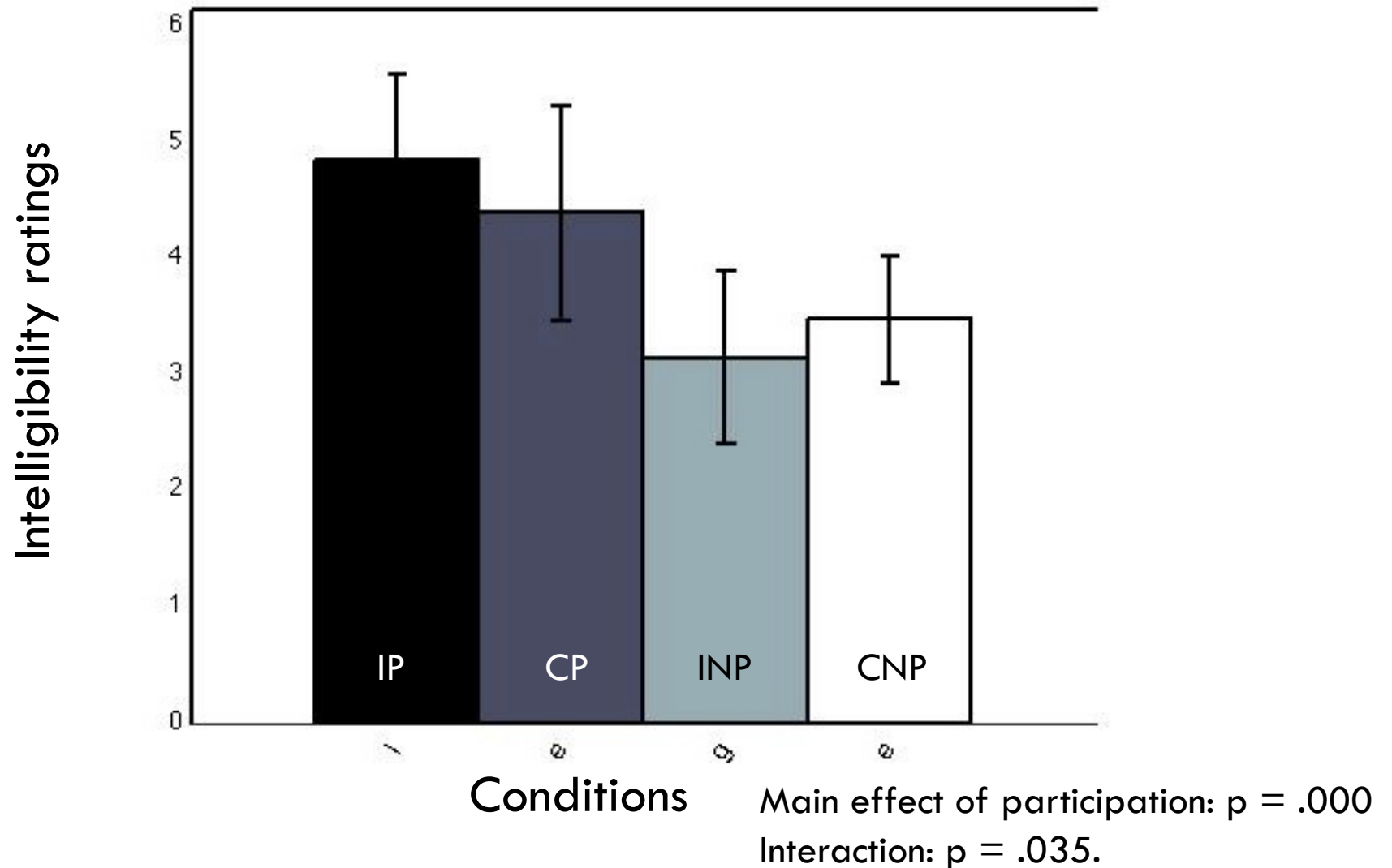
- Behavior:
 - Meaning related task: collective > individual models (non-participatory models)
 - Mental rotation: performance: collective > individual models (participatory models)

- Brain:
 - Meaning-related task: Interaction between the two factors (participation/non-participation; individual/collective) in typical 'social brain areas' i.e.
 - medial prefrontal cortex, temporal pole, TPJ/STS, Broca

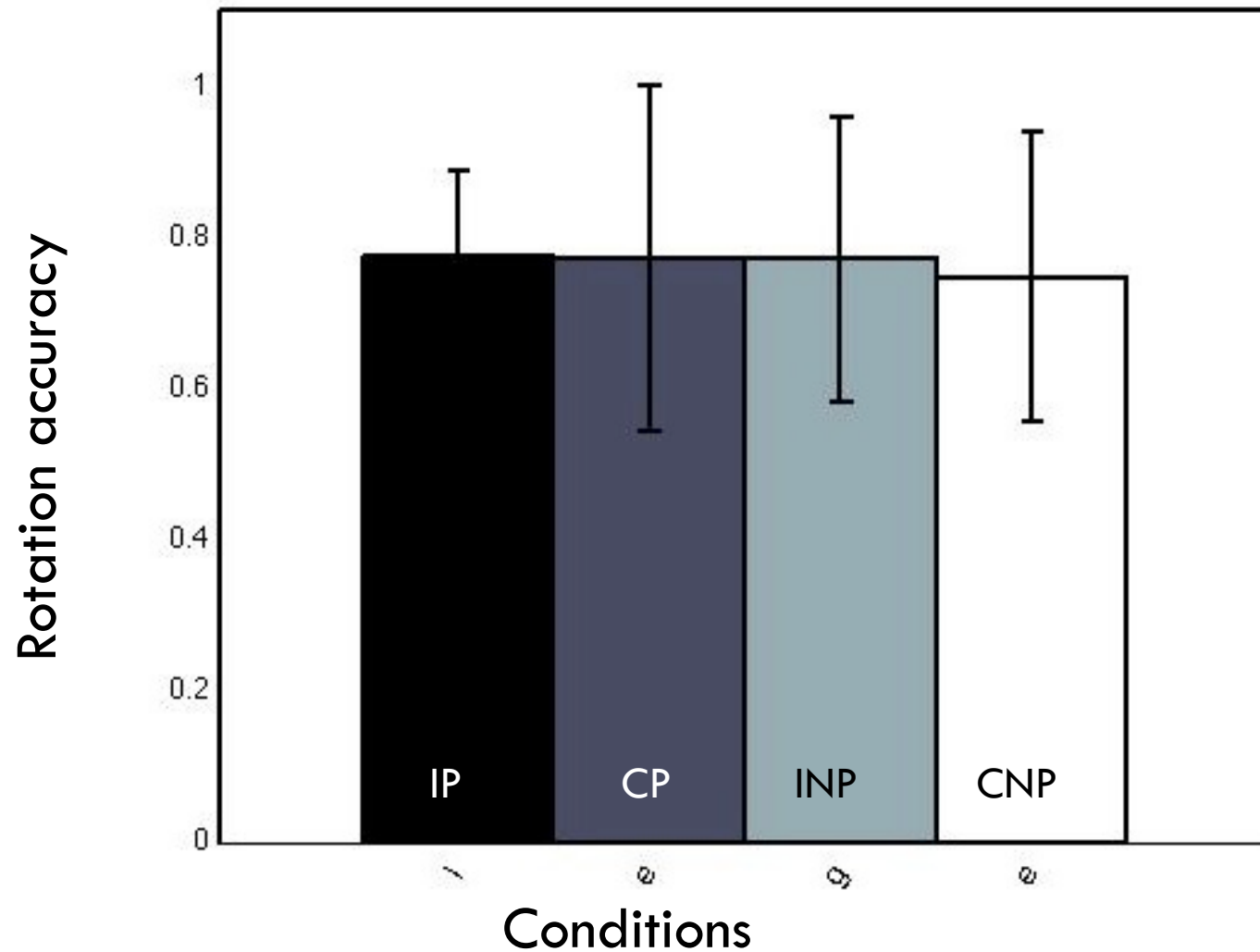
 - Mental rotation task:
 - Modulations of parietal/intraparietal sulcus

- Heart rate:
 - within group synchronization will be higher in collective tasks than in identical individual tasks

Preliminary behavioral results I



Preliminary behavioral results II



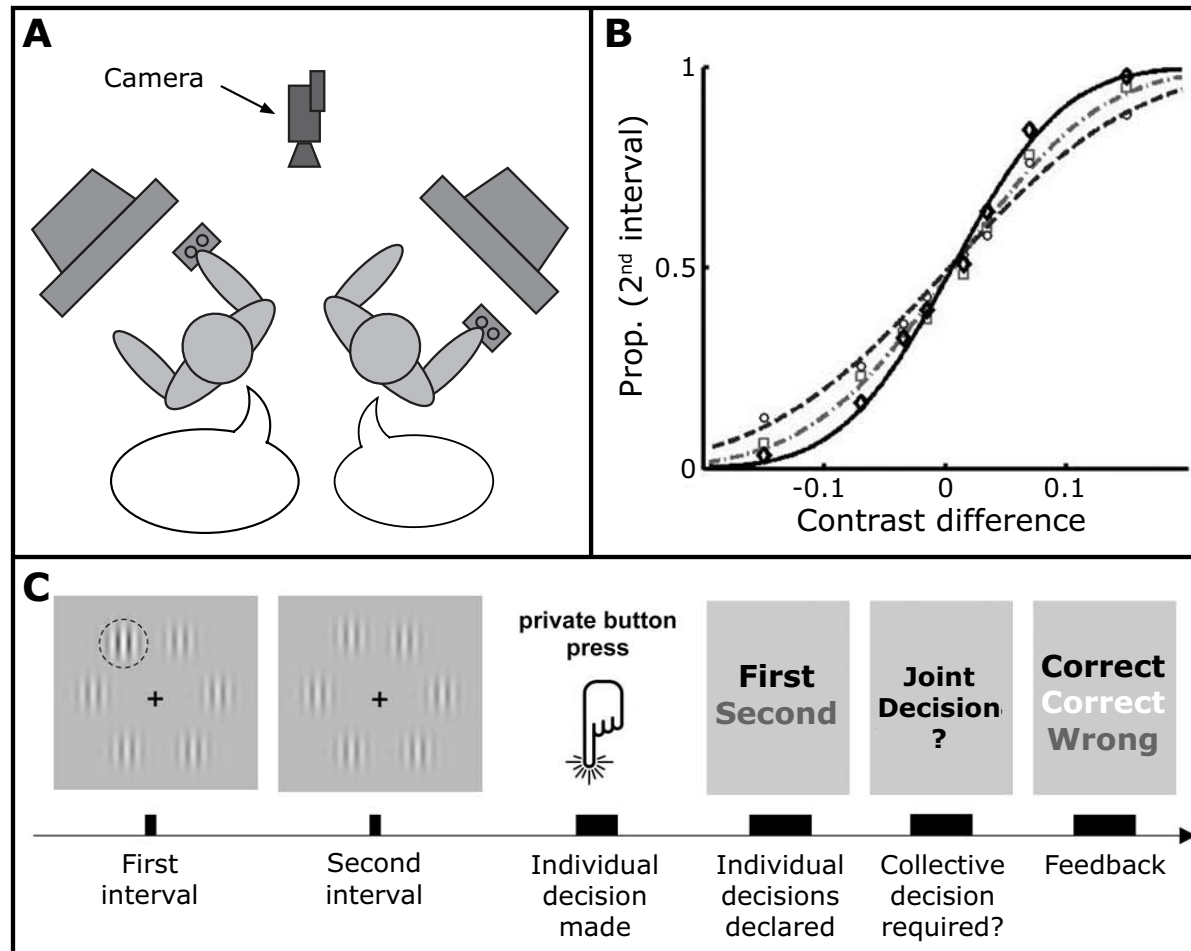
No significant results

What now?



- More data!
 - ▣ Follow up in two weeks with 30 more participants
 - ▣ Only one group at a time to optimize video and audio collection
- fMRI, video and heart rate data analysis
- Models interpretability from naïve participants

Experiment II: Sharing confidence in a joint perceptual decision task



Interaction 43(S)

A (0:02:42.1) we take yours because I saw nothing
B (0:02:43.7) I didn't see anything either – I saw ...
A (0:02:46.2) I took a bet
B (0:02:47.2) [way to go!
A (0:02:47.3) [way to go!
B (0:02:48.5) mine was also just a bet there

Interaction 44(F)

B (0:02:58.3) ((laughs)) I don't know
A (0:02:59.4) I don't know either
A (0:03:00.3) I saw something both in the left corner and in the center on the right in both of them
B (0:03:04.6) okay, I think it was over in the left side, but oehm I'll pass
A (0:03:13.6) no!
B (0:03:16.3) we ruin the scores – now we must...
A (0:03:18.0) yeah, now we must pull ourselves together



Linguistic expression and
assessment of confidence

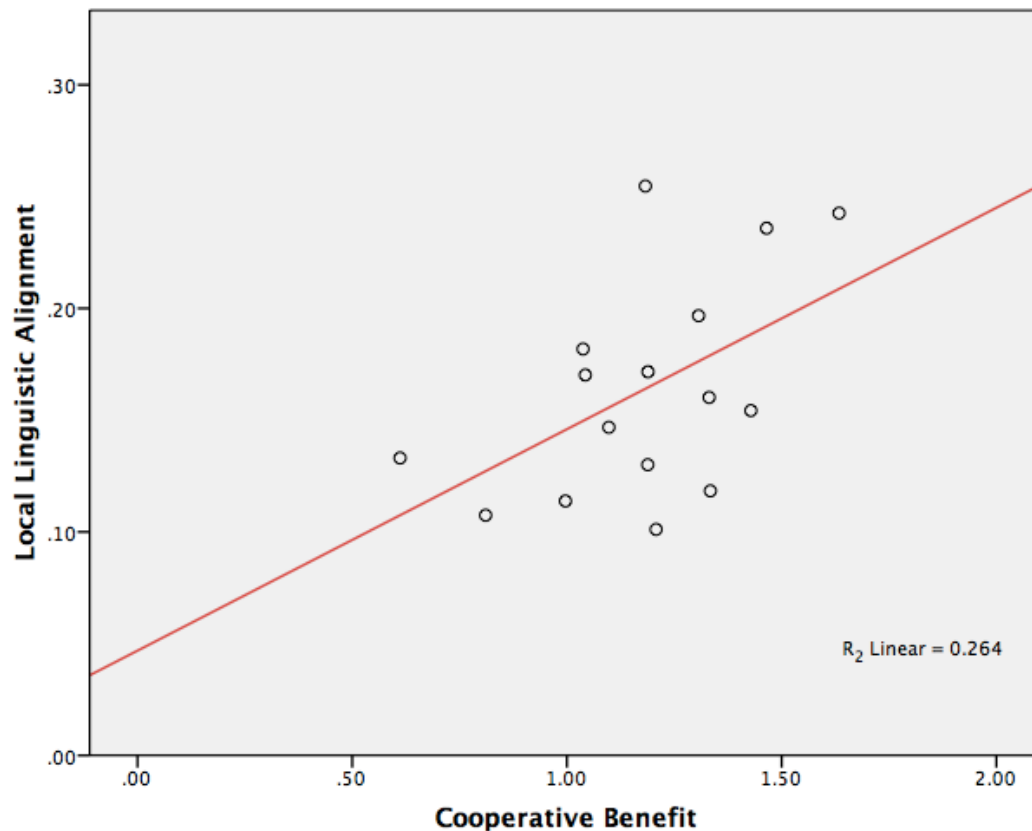
N = 16 pairs

Data: 1470 short interactions ≈
approx. 20 hours of video

Coordinating effects of verbal alignment

Measure 1 - Local Linguistic Alignment: the transition probability that a participant repeats the other participant's **confidence expression** from the previous interaction:

$$P(S(X)_n | S(Y)_{n-1})$$

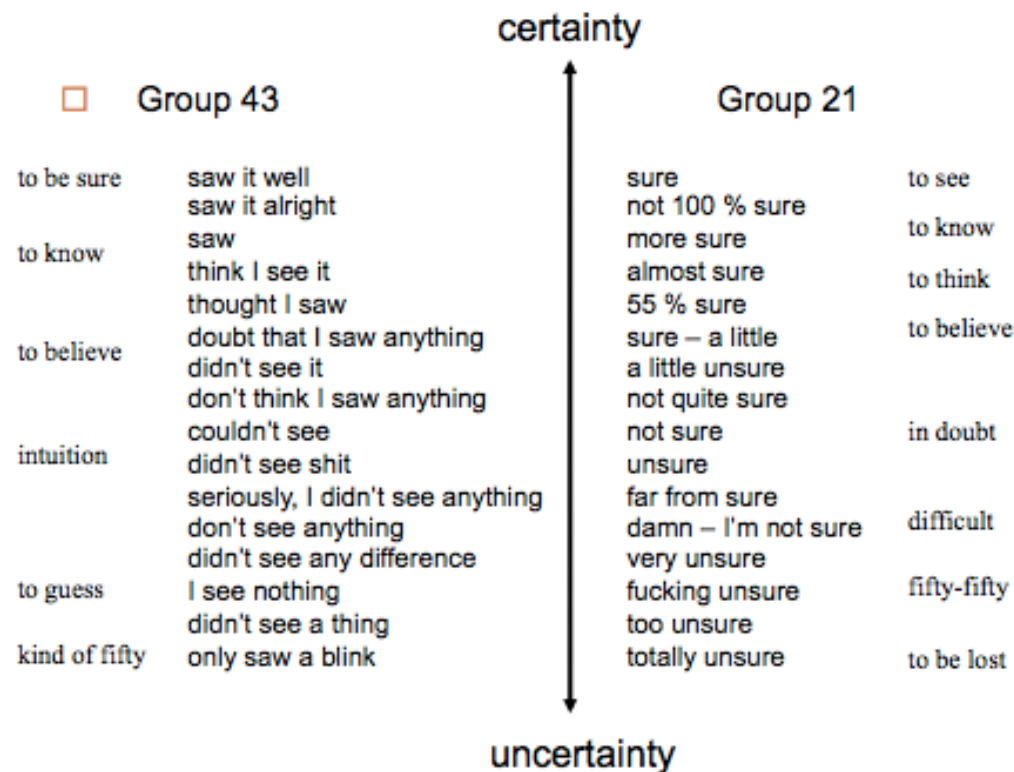


Hypothesis: the more the participants tend to align locally, the higher the cooperative benefit

$$r = .51, r^2 = .26,$$
$$F(1,14) = 5.03$$
$$p < .05$$

Beyond mere alignment

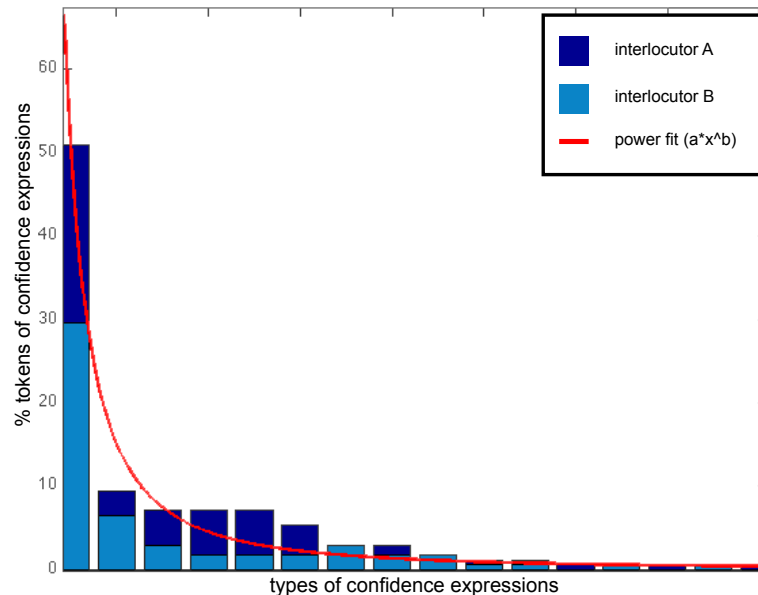
- Through verbal alignment, interacting agents gradually develop stable linguistic (or symbolic) structures.



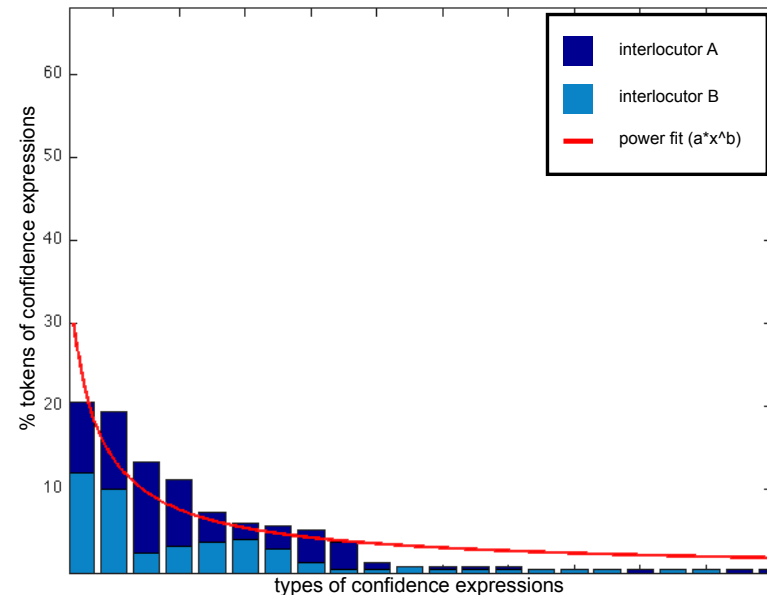
Stable symbolic patterns

- **Measure 2 - Global Linguistic Convergence:** the degree to which a dyad converges on a single set of confidence expressions rather than indecisively drifts between numerous types of expressions:
 - The percentage of the overall confidence expressions belonging to the most frequent type

Example of linguistic convergence - good group

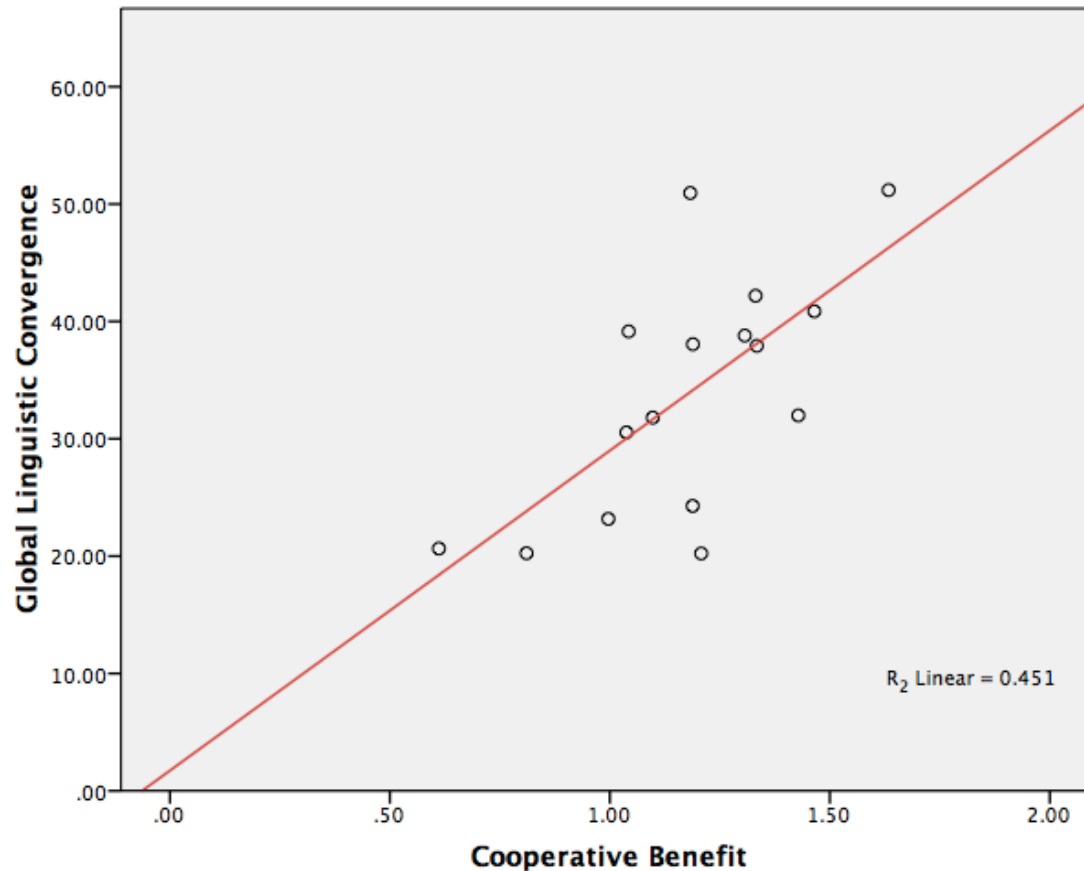


Example of linguistic convergence - bad group



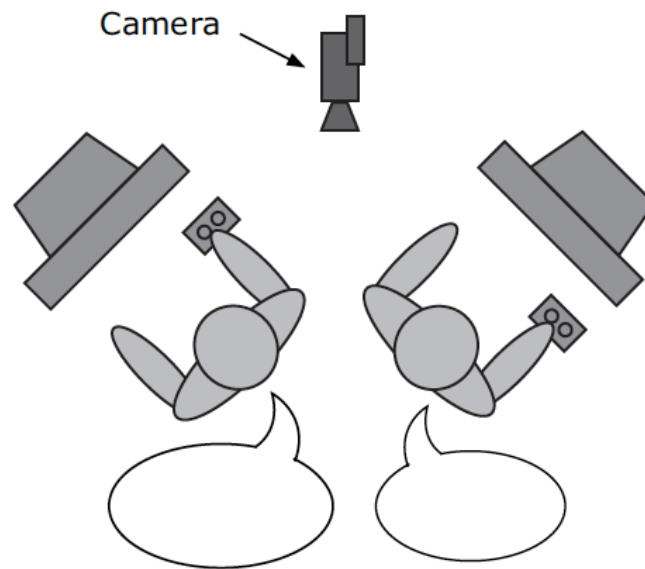
Coordinating effects of stable symbolic patterns

Hypothesis: The more stable the symbolic patterns, the higher the cooperative benefit



$r = .67, r^2 = .45$
 $F(1,14) = 11.52$
 $p < .005$

Cross-cultural comparisons



Cultural strategies?

□ Negotiating authority vs. negotiating uncertainty

A: 按你的吧。
'Take yours.'
B: 按你的。呃
'Take yours. Errr'
A 第2个
'The 2nd one'
B 第2个试一下。
'The 2nd one try it.'

A: vi tager din for jeg så intet
'we take yours because I saw nothing'
B: jeg så heller ikke noget - jeg så ...
'I didn't see anything either - I saw ...'
A: jeg satsede
'I took a bet'
B: sådan!
'way to go!'
A: sådan!
'way to go!'
B: det var også et sats det jeg lavede der
'mine was also just a bet there'

□ Implications for the construction of confidence:

- Different focus on the confidence scale

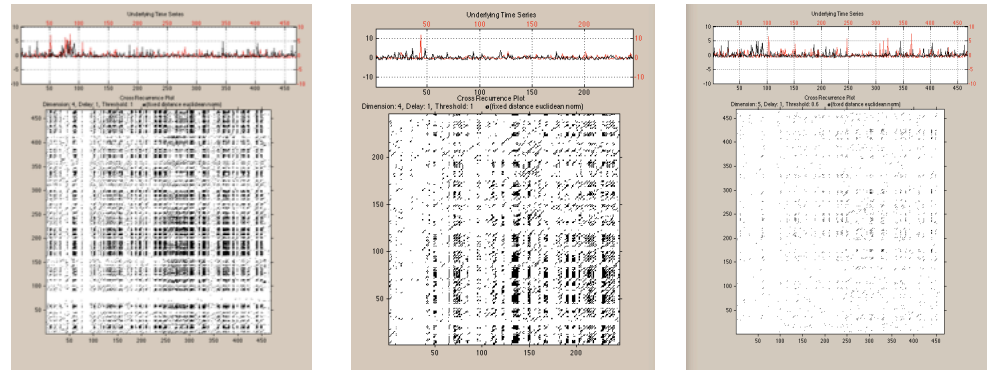
$r = .8343$ $t = 6.7971$ $p < .000001$

- Different amount of items on the confidence scales

$r = .5579$ $t = 3.1534$ $p < .005$

What now?

- Measuring the rhythms of coordination



- Pairs vs. communities

- Different coordinative/competitive tasks

Two paradigms, many possibilities

Lego Experiment

- Building meaningful objects, material symbols
- Individual vs. group
- Effects on interpretability
- Physiological and neuro-cognitive processes

Sharing confidence

- Developing patterns of interactions
- Isolated pair vs. community
- Effects on coordination and joint decisions
- Cross-cultural comparison



Thanks!

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